DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AB32

Endangered and Threatened Wildlife and Plants; Proposed Threatened Status for the Northern Spotted Owl

AGENCY: U.S. Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) proposes to determine the northern spotted owl (*Strix occidentialis caurina*) as a threatened species pursuant to the Endangered Species Act (Act) of 1973, as amended. The present range of the subspecies is from southwestern British Columbia through western Washington, western Oregon, and the coast range area of northwestern California south to San Francisco Bay. The northern spotted owl is threatened throughout its range by the loss and adverse modification of old-growth and mature forest habitat primarily from commercial timber harvesting. This proposed rule, if made final, will extend the Act's protection to the northern spotted owl. The Service seeks data and comments from the public on this proposed rule.

DATES: Comments from all interested parties must be received by September 21, 1989. The Act requires the Service to promptly hold one public hearing on the proposed listing regulation should a person file a request for such a hearing by August 7, 1989 (section 4(b)(5)(E); 16 U.S.C 1533(b)(5)(E)). Because of anticipated widespread public interest, the Service has decided to hold four public hearings. See **"SUPPLEMENTARY INFORMATION"** for dates of hearings.

ADDRESSES: Comments and materials concerning this proposal should be sent to the Regional Director (Attn: Listing Coordinator), U.S. Fish and Wildlife Service, 1002 NE Holladay Street, Portland, Oregon 97232. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the above address. See **"SUPPLEMENTARY INFORMATION"** for location of hearings.

FOR FURTHER INFORMATION CONTACT: Mr. Robert P. Smith, Assistant Regional Director for Fish and Wildlife Enhancement at the above address (503/231-6150 or FTS 429-6150.

SUPLEMENTARY INFORMATION:

Hearing Information

August 14, 1989—Columbia River Red Lion Inn, Riverview Room, 1401 N. Hayden Island Drive, Portland, Oregon 97217.

August 17, 1989—Redding Convention Center, 700 Auditorium Drive, Redding, California 96001.

August 21, 1989—Washington Center for the Performing Arts, 512 South Washington Street, Olympia, Washington 98501.

August 28, 1989—Lane County Convention Center Auditorium, 796 West 13th Street, Eugene, Oregon 97402.

A public hearing will be conducted at each of these locations from 1:00 to 4:30 p.m., and from 6:00 to 9:00 p.m. Oral statements may be limited to 5 or 10 minutes, if the number of parties present desiring to give such statements necessitates some limitation. There are no limits to the lengths of any written statement presented at a hearing or mailed to the Service. Oral comments presented at the public hearings are given the same weight and consideration as are comments submitted in written form. Should the public hearings scheduled be insufficient to provide all individuals with an opportunity to speak, anyone not accommodated will be requested to submit their comments in writing.

Background

The spotted owl (*Strix occidentalis*), consisting of three subspecies (northern, California, and Mexican), is a medium-sized owl with dark eyes, dark-to-chestnut brown coloring, with whitish spots on the head and neck and white mottling on the abdomen and breast. The first record of the spotted owl was made in 1858 in the west end of the Tehachapi Mountains in southern California (Xantus 1859). It was first observed in the Pacific Northwest in 1892 (Bent 1938). Though observed only occasionally prior to the 1970's, northern spotted owls since that time have been found to be more common in certain types of forested habitat throughout its range (USDA 1986).

Although a secretive and mostly nocturnal bird, the northern spotted owl is apparently unafraid of humans (Bent 1938, Forsman *et al.* 1984, USDA 1986). The spotted owl is site-tenacious and maintains a territory year-round: however, in some cases, individuals may migrate seasonally on a local basis, changing their home range size or location between the summer and winter. Monogamous and long-lived, spotted owls tend to mate for life, although it is not known if pair-bonding or site-tenacity is the determining factor. The adult female is slightly larger than the male.

Spotted owls are perch-and-dive predators and over 50 percent of their prey items are arboreal or semiarboreal species. Spotted owls subsist on a variety of mammals, birds, reptiles, and insects, with small mammals such as flying squirrels (*Glaucomys sabrinus*), red tree voles (*Arborimus longicaudus*) and dusky-footed woodrats (*Neotoma fuscipes*) making up the bulk of the food items throughout the species' range (Solis and Gutierrez 1982, Forsman *et al.* 1984, Barrows 1985).

Three subspecies of the spotted owl currently are recognized by the American Ornithologists' Union (1957): the northern spotted owl (*Strix occidentalis caurina*), the California spotted owl (*S. o. occidentalis*), and the Mexican spotted owl (*S. o. lucida*). Northern spotted owls are distinguished from the other subspecies by their darker brown color and smaller white spots and markings (Merriam 1898, Nelson 1903, Bent 1938). Juvenile plumage is similar to adult plumage except for ragged white downy tips on the tail feathers of the juvenile. Oberholser (1915) reported that there was considerable overlap in color of plumage between the northern and California spotted owl subspecies in California. The geographical separation between these two subspecies presumably occurs within a 12-to-15-mile gap of forested habitat between southeastern Shasta and northwestern Lassen National Forests, where the Sierra Nevada contacts the Klamath physiographic province; the Pit River is generally accepted as the boundary between the two California subspecies (USDA 1986; G. Gould, California Dept. of Fish and Game, Sacramento, CA, pers. comm.).

Barrowclough (1987) examined available museum specimens of all three spotted owl subspecies to investigate geographical variation within and between these taxa. In his unpublished findings, he reported clinal variation over the range of the northern and California subspecies and questioned the validity of considering these two taxa as distinct subspecies. It should be noted that Barrowclough's (1987) draft manuscript has yet to be accepted and published, and that the Service generally relies on the latest published information in peer-reviewed ornithological journals to establish taxonomic affinities. Although the geographical separation between the northern and California subspecies is within the dispersal capabilities of the

owl (E.C. Meslow, U.S. Fish and Wildlife Service Coop. Unit, Oregon State Univ., Corvallis, OR, pers. comm.), there are no data available to determine whether genetic exchange occurs between the two subspecies in California.

Spotted owls usually do not nest every year nor are nesting pairs successful every year. Early nesting behavior begins in February to March with nesting occurring March to June. The average clutch size is 2 eggs, with a range of 1 to 4. A 1:1 sex ratio of adult males to adult females is assumed from known data. Fledging occurs from mid-May to late June, with parental care continuing into September. Females are capable of breeding as 2-year-olds, but most probably do not breed until they are at least 3 years of age (Barrows 1985, Miller and 1985b, Franklin *et al.* 1986). A few subadult males have been observed paired with adult females (Wagner and Meslow 1986, Miller and Meslow 1985b). Males do most of the foraging during incubation and assist with foraging during the fledging period.

Reproduction by spotted owls has fluctuated dramatically from year to year in some areas (Forsman *et al.* 1984, Barrows 1985, USDA 1986, Allen *et al.* 1987). In some years most pairs may breed, whereas in other years very few pairs even attempt to nest. Gutierrez *et al.* (1984) noted a broad failure in reproduction from northern California through Washington in 1982. It has been suggested that fluctuations in reproduction and numbers of pairs breeding may be related to fluctuations in prey availability (Forsman *et al.* 1984, Barrows 1985, Gutierrez 1985). Both the proportion of pairs occupying territories that attempt to breed and the proportion of pairs attempting to breed that are successful (i.e., fledge young) vary from year to year (Franklin *et al.* 1987; Forsman *et al.* 1984; Meslow *et al.* 1986; The Washington Department of Wildlife 1987; Miller and Meslow 1985b; Gutierrez *et al.* 1984; G.S. Miller, pers. comm.). Average reproductive rates for Oregon and California (Marcot 1986) range from 0.49 to 0.67 juveniles per pair (Franklin *et al.* 1987; Marcot and Holthausen 1987; Forsman *et al.* 1984; Gutierrez *et al.* 1985a; Barrowclough and Coats 1985).

Mortality rates of juveniles are significantly higher than adult rates (Forsman *et al.* 1984, Miller and Meslow 1985a and 1986b, Gutierrez *et al.* 1985a and b). Recent studies of juvenile dispersal in Oregon and California indicate that few of the juvenile spotted owls survived to reproduce (Gutierrez *et al.* 1985a and b, Miller and Meslow 1985a and b, 1986b). These research studies all report very high mortality during predispersal and the first months of dispersal. In one study, out of 48 juveniles radiotracked during a 3-year study, only 3 were known to be alive after 1 year (the fate of 6 was unknown because transmitter signals were lost) (Meslow and Miller 1986b). Twelve of 23 juveniles in a 2-year study in California died during the dispersal period; the fate of the other 11 was unknown (Gutierrez *et al.* 1985b). It is not known whether the use of radio transmitters attached to juveniles for tracking purposes contribute to juvenile mortality (Irwin 1987; Dawson *et al.* 1986); researchers using this technique believe it should not measurably influence juvenile survival if done properly (Meslow, pers. comm.).

Using the data for the few years available, Marcot and Holthausen (1987) estimated that about 60 percent of juveniles live until they disperse from their nesting areas, but only about 18 percent of those fledged survive for 1 year. Miller and Meslow's (1986a) 4-year study in Oregon estimated first year post-dispersal survival at 19 percent. Gutierrez *et al.* (1985b) estimated a maximum of 50 percent survival in California based on 2 years of data, while Marcot (1986) estimated overall survival of juvenile owls from hatching through the first year of life at 11 to 12 percent.

The current range of the northern spotted owl is from southwestern British Columbia, western Washington, western Oregon, and northern California south to San Francisco Bay. The southeastern boundary of its range, separating this subspecies from the California spotted owl, is the Pit River area of Shasta County, California. Populations are not evenly distributed throughout its present range. The majority of individuals is found in the Cascades of Oregon and the Klamath Mountains in southwestern Oregon and northwestern California (USDA 1988; Gould, pers. comm.; USDI 1989). This area represents the core of the present range of this subspecies. Evidently, northern spotted owls reach their highest population densities and have their best reproductive success in suitable habitat in this part of their range (Franklin and Gutierrez 1988; Franklin *et al.* 1989; Miller and Meslow 1988; USDI 1987, 1989; Robertson 1989). Habitat in southwestern Oregon begins to change south of Roseburg to a drier Douglas-fir/mixed conifer habitat with a corresponding change in prey base (from flying squirrels to woodrats) (Meslow, pers. comm.). In addition, historical logging practices in the mixed conifer zone consisted of more selective timber harvesting than in other areas, leaving remnant stands of old growth or stands of varying ages with old-growth characteristics; this situation is also present along the east side of the Cascades in Washington.

Northern Washington and southern British Columbia represent the northern extent of the range of the northern subspecies; population densities and numbers are lowest in these areas. Very few pairs have been located in British Columbia; all have been located near the United States border. Few owls (pairs or singles) are presently found in the Coast Ranges in southwestern Washington or in the northwestern Oregon Coast Ranges (north from the southern portion of the Siuslaw National Forest). The population also decreases in size and density toward its southern extreme along the coast range in Marin, Napa, and Sonoma Counties, California. Little data on numbers and distribution on private, State, or tribal lands in these areas are available, although the spotted owl may have been nearly extirpated from much of these lands due to reduction of old-growth habitat (Forsman 1986; E. Forsman, USDA Forest Service, Pacific NW Research Station, Olympia, WA, pers. comm.; Gould, pers. comm.).

The northern spotted owl is known from most of the major types of coniferous forests in the Pacific Northwest (Forsman *et al.* 1977, 1984; Forsman and Meslow 1985; Gould 1974, 1975, 1979; Garcia 1979; Marcot and Gardetto 1980; Solis 1983; Sisco and Gutierrez 1984; Gutierrez *et al.* 1984). The historical range of the northern spotted owl extended throughout the coniferous forest region from southwestern British Columbia south through western Washington, western Oregon, and the Coast Ranges of California to San Francisco Bay (USDA 1986). The current range and distribution of the northern subspecies is similar to the historical range where forested habitat still exists. The owl has been extirpated or is uncommon in certain areas as the result of decline or modification of old-growth and mature habitat and thus its distribution is now discontinuous over its range (Dawson *et al.* 1986, Forsman 1986).

In California, northern spotted owls most commonly use the Douglas-fir (*Pseudotsuga menziesii*) and mixed conifer forest types (Marcot and Gardetto 1980, Solis 1983, and Gutierrez 1985). Gould (1974) reported finding spotted owls in northwestern California in coast redwood (*Sequoia sempervirens*), Douglas-fir and Bishop pine (*Pinus muricata*) forests, and also

in stands dominated by ponderosa pine (*Pinus ponderosa*). In Washington's coastal forest, the spotted owl is found in forests dominated by Douglas-fir and western hemlock (*Tsuga heterophylla*). At higher elevations in western Washington, Pacific silver fir (*Abies amabilis*) is commonly used by owls whereas on the east side of the Cascades Douglas-fir and grand fir (*Abies grandis*) are used (Postovit 1977). Availability of forest types within a region may be responsible for the observed differences in use among types (Gutierrez 1985; Meslow *et al.* 1986). Gould (pers. comm.) observed that preferred habitat particularly in California is not continuous, but occurs naturally in a mosaic pattern, especially in the southern portions of the State.

Spotted owls have been observed over a wide range of elevations, although they seem to avoid higher elevation, subalpine forests (USDA 1986). Garcia (1979) reports that spotted owl densities in Washington were greatest below 4,100 feet elevation. Postovit (1977) found owls on the Olympic Peninsula at elevations ranging from 70 to 3,200 feet and an elevation range of 1,600 to 4,200 feet in the Cascade Mountains of Washington. On the east side of Washington's Cascades, J. Casson (USDA Forest Service, Wenatchee N.F., WA, pers. comm.) found owls up to 5,000 feet elevation and almost always in association with Douglas-fir. Northern spotted owls have been observed occasionally at elevations up to 6,000 feet or more in California (Gould, pers. comm.).

Preferred forest habitat used by spotted owls is generally characterized by the presence of a multi-layered stand structure, dense tree canopy closure, and large trees with cavities or broken tops. These are characteristics that generally typify old-growth forests, although some old-growth characteristics preferred by spotted owls may appear in mature forests. Old-growth stands tend to have a high degree of decadence with abundant standing and down dead trees, and supporting a high density of prey species (Forsman 1976, 1980; Gould 1977; Postovit 1977; Barrows and Barrows 1978; Garcia 1979; USDA 1986; Barrows 1981; Solis and Gutierrez 1982; Forsman *et al.* 1984; Gutierrez *et al.* 1984; Carey 1985; Ruediger 1985).

Northern spotted owl preferences for old-growth forests and forests with old-growth characteristics have been established using different types of information, including relative abundance, proportion of occupied sites containing old growth, and allocation of time. For the coniferous forest within the range of the northern spotted owl, young or second-growth forest is generally defined as less than 100 years of age, mature forest as stands from 100 to 200 years old, and old growth as forest more than 200 years old. Forsman *et al.* (1977) computed the relative abundance of spotted owls in Oregon, and found that densities of spotted owl pairs were 12 times higher in old growth than in young-growth forests. Of 1,502 observations of owls, Forsman *et al.* (1987) found that 1,282 were in old growth, 22 in mature forest, 131 in old-growth/mature forest, and 67 in stands less than 100 years of age, demonstrating an overwhelming preference for old growth (USDI 1989). Pairs were evident at 928 of these 1,502 sites. Other studies by Forsman *et al.* (1984, 1987) analyzed the habitat characteristics of spotted owl sites in Oregon and observed that more than 90 percent of sites occupied by owls contained a major component of old-growth forest. Similar studies conducted by Marcot and Gardetto (1980) in northern California found that 95 percent of spotted owl sites were in old-growth stands. Ninety-seven percent of the spotted owl population in Washington was found in old-growth/mature forest; there were no known reproductive pairs in managed second-growth forest (Allen 1988). Many apparently suitable sites are not occupied every year. Marcot and Holthausen (1987) compared percent occurrence of occupancy to amount of area in old growth at each site. The results of their analysis showed probability of use is positively correlated with the percent of area containing old-growth forest types.

Forsman *et al.* (1984) analyzed home range data for eight radio-equipped adult spotted owls in the H.J. Andrews Study Area on the west slope of the Cascade Range. Home range is defined as an area within which the activities of an animal are confined. Whereas the percent of old-growth conifer forest in their home ranges varied from 33 to 66 percent, the percent of time spent foraging in old growth by the eight owls ranged from 85 to 99 percent, demonstrating a non-random use and pronounced preference for old growth. All eight owls foraged in old-growth conifer forest significantly more than expected based upon availability of that habitat relative to other habitat types in the study area. Use of 5- to 60-year-old stands was significantly less than expected except in the case of a single bird whose use of a small portion of 31- to 60-year-old forest within its range was in direct proportion to availability. Recent clearcuts or burned areas were rarely used (Forsman *et al.* 1984). Similar trends have been noted for northern spotted owls in the Coast Range of Oregon (Forsman *et al.* 1984; Reid *et al.* 1987), and the Klamath and Cascade Mountains (Meslow *et al.* 1986).

In addition, this preference for old growth has been evident from observations of roosting owls as well as during the dispersal period by juveniles. In analyzing dispersal patterns by juvenile owls, Miller (1989) found that the 18 radio-equipped individuals he studied used a variety of habitats. However, 12 of the 18 birds selected old-growth/mature forests significantly more than expected based on availability. Forsman *et al.* (1984) reported that 97.6 percent of 1,098 adult spotted owl roost sites in the central Oregon Cascades were in old-growth forest; 91 percent of 555 roost sites on BLM Coast Ranges forests were in old growth.

Although the literature strongly supports the generalization that owls preferentially select old-growth forests over young growth (USDI 1989), there are records of owls using young-growth forests. These data on young-growth forests have led to questions on the importance of old-growth habitat to spotted owl populations (e.g., Irwin 1987). In addition to the studies noted earlier (Irwin *et al.* 1989a), Irwin *et al.* (1989b) examined the immediate vicinity surrounding and including 29 nest sites on the Wenatchee and Okanogan National Forests in the Washington Cascades. Each of these nests apparently had successfully fledged at least one young in 1987 and/or 1988. The authors noted that while characteristics of many of these sites did not completely coincide with the general description of old growth, most of the sites retained dense, multi-layered canopies; no estimate was made of the amount of old growth within the home ranges of the owls whose nest sites were included in the analysis. As noted earlier, the presence of a dense, multi-layered canopy is an important structural characteristic typical of old-growth forests. Surveys in the northern third of the Oregon Coast Ranges (Forsman 1986) and in southwestern Washington (Irwin *et al.* 1989a) revealed a low density of spotted owls within this portion of their range and a paucity of old-growth habitat in this area, suggesting that this type of habitat (i.e., 40- to 120-year-old managed forest or predominantly young-growth forest) is

not preferred or suitable habitat for northern spotted owls.

Northern spotted owls have relatively large home ranges. Researchers, using radiotelemetry techniques, have recorded home range sizes used by adult spotted owls ranging from approximately 300 acres to more than 19,000 acres (Solis 1983; Forsman *et al.* 1984; Sisco and Gutierrez 1984; Allen and Brewer 1985; Forsman and Meslow 1985; Brewer 1985; Forsman 1986; Meslow *et al.* 1986; Allen *et al. 1987;* Reid *et al.* 1987; N. Tilghman, USDA Forest Service, Redwoods Sciences Research Station, Arcata, CA, pers. comm.). In a sample of 14 pairs of northern spotted owls in the Coast Ranges of Oregon, A. Carey (USDA Forest Service, Pacific NW Research Station, Olympia, WA, pers. comm.) calculated mean home range size to be 5,425 acres of which 2,549 acres were old growth. Estimated mean home range size for northern spotted owl pairs ranges from 1,700 acres in northwestern California to about 12,500 acres on the Olympic Peninsula (USDI 1987, 1989). The estimated mean home range size and amount of included preferred habitat is smaller for a single bird than for a pair in those areas studied (USDA 1988). In general, home range sizes are smallest during the spring and summer (reproductive period), largest during the fall and winter (non-reproductive), increase from south to north, and increase with increasing elevation. Pairs of owls may also occupy overlapping home ranges (Forsman *et al.* 1984; Solis 1983).

Significantly, research indicates that spotted owls on the Olympic Peninsula and Oregon Coast Ranges consistently occupy larger home ranges than owls in the other provinces. These areas also have the fewest pairs of spotted owls and the least remaining old-growth forest (USDA 1989). The large home range sizes reported for owl pairs on the Olympic Peninsula, Oregon Coast Ranges, and on the west side of the Cascade Range in Washington (USDI 1989) may reflect: (1) The adverse influence of forest fragmentation resulting from timber harvest; and (2) the fact that the Washington locations are near the periphery of the subspecies' range. Forests within these provinces are highly fragmented and have the least amount of old-growth forest remaining within the range of the owl. For example, on the Siuslaw National Forest, located within the Coast Ranges of Oregon, remaining old-growth timber occurs in widely separated and relatively small parcels (Harris 1984). In this area, the owls utilize the available old growth in a highly fragmented and patchy environment (Friesen and Meslow 1988). This pattern is probably true for the Olympic Peninsula as well. The above findings and those of Allen and Brewer (1985), Forsman *et al.* (1984), Carey (1985), and Dawson *et al.* (1986), suggest that home range size increases as quality and quantity per unit area of preferred habitat declines (USDI 1989).

There are no estimates of the historical population size and distribution of the northern spotted owl within preferred habitat, although spotted owls are believed to have inhabited most old-growth forests throughout the Pacific Northwest prior to modern settlement (mid-1800s), including northwestern California (USDI 1989). Spotted owls are still found within their historical range in most areas where preferred and suitable habitat exist, although most of the owls are restricted within this range to mature and old-growth forests managed by the Federal government. Over 90 percent of the known number of spotted owls have been located on federally managed lands (Forsman *et al.* 1987; USDA 1988; USDI 1989; Gould, pers. comm.). Little information is available on numbers and distribution of owls on private, State, or tribal lands in these areas, although the spotted owl may be nearly extirpated from much of these lands due to reduction of old-growth habitat (Forsman 1986; Forsman, pers. comm.; Gould, pers. comm.).

Petition Process Background

On January 28, 1987, the Fish and Wildlife Service (Service) received a petition submitted by Greenworld requesting the listing of the northern spotted owl (*Strix occidentalis caurina*) as an endangered species under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act). On July 23, 1987, the Service accepted the Greenworld petition as presenting substantial information indicating that listing might be warranted and initiated a status review.

On August 4, 1987, the Service received a second petition, submitted by the Sierra Club Legal Defense Fund, Inc. on behalf of 29 conservation organizations, requesting that the populations of northern spotted owls on the Olympic Peninsula in Washington and the Coast Ranges of Oregon be listed as endangered pursuant to the Act, and that the subspecies be listed as threatened throughout the remainder of its range in Washington, Oregon, and northern California. The Sierra Club Legal Defense Fund, Inc. requested that its petition be consolidated with the petition by Greenworld. In accordance with its established policy, the Service treated this second petition as a public comment to be considered in evaluating the original listing petition. As a result, the time frames and schedules required by the first petition remained the same. Both petitions sought the designation of critical habitat.

Section 4(b)(3) of the Act requires the Secretary of the Interior to reach a final decision on any petition accepted for review within 12 months of its receipt. In conducting its review, the Service published a notice in the **Federal Register** (52 FR 34396) on September 11, 1987, requesting public comments and biological data on the status of the northern spotted owl. In addition, a status review team of three Service biologists was established. This team reviewed and evaluated all comments and information received in response to the September 11 notice as well as all other information in the Service's files or gathered in the effort to review the status of the subspecies. Two sequential drafts of the status review were prepared by the Service team and submitted for review by scientists, researchers, and others knowledgeable about the spotted owl in the Pacific Northwest.

On December 14, 1987, the Service team completed its status review on the northern spotted owl. On December 17, 1987, the Service's Regional Director for Region 1 made a finding, based on the review, that listing the northern spotted owl pursuant to Section 4(b)(3)(B)(i) of the Act was not warranted at that time. The Regional Director noted that because of the need for population trend information and other biological data, high priority would be given to this subspecies for continued monitoring and further research. Notice of this finding was published in the **Federal Register** on December 23, 1987 (52 FR 48552).

On May 5, 1988, the Sierra Club Legal Defense Fund, Inc. filed suit on behalf of 23 environmental organizations in the U.S. District Court for the Western District of Washington (Northern Spotted Owl v. Hodel, No. C88–573Z, W.D., Wash. 1988) challenging the Service's finding on the listing petitions. In an order issued on November 17, 1988, the Court concluded that the Service's finding was arbitrary and capricious or contrary to law, and remanded the matter to the Service for further review. The Service was specifically ordered to: provide an analysis and explanation for its finding; explain the reasoning for not listing the owl as threatened; and to supplement its status review and petition finding.

On December 5, 1988, the Director of the Service established a new status review team, consisting of 12 Service biologists, to conduct an in-depth review and interpretation of all data and other information that had been made available to the Service in 1987 on the issue. After reviewing the 1987 administrative record, the Service concluded that there was considerable new information available that had not been present in the original record and that such information was needed to respond sufficiently to the Court's request and to meet the Act's requirement to evaluate the best available biological information. In an order issued on January 12, 1989, the Court granted the Service's request to reopen the administrative record for the status review and petition finding for a period not to extend beyond February 28, 1989. The Service published a notice in the Federal Register (54 FR 4049; January 27, 1989) reopening the status review and soliciting comments, data, and other information. In its order of January 12, the Court gave the Service until May 1, 1989, to complete the additional status review, supplement the status review report, and submit to the court a new analysis and finding on the petition to list the northern spotted owl as endangered or threatened. On April 21, 1989, the team completed the review and submitted a supplemental status review report to the Regional Director, Region 1, Fish and Wildlife Service. On April 25, 1989, the Regional Director issued a revised petition finding indicating that listing the northern spotted owl as a threatened species throughout its entire range is warranted and that the Service would pursue promptly the listing process for the species. This proposal constitutes the final revised finding for the petitioned action.

The entire spotted owl species (*Strix occidentalis*) is listed on the Service's Notice of Review for vertebrate wildlife as a candidate species for listing, category 2. A category 2 species is one for which listing may be appropriate but additional information is needed. The information submitted and reviewed as part of the status review process for the northern spotted owl contributed to the supplemental information needed on which to base a decision to propose this subspecies for listing.

Summary of Factors Affecting the Species

Section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and regulations promulgated to implement the listing provisions of the Act (50 CFR Part 424) set forth the procedures for adding species to the Federal lists. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in Section 4(a)(1). These factors and their application to the northern spotted owl (*Strix occidentalis caurina*) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Western Oregon and Washington were covered by approximately 24 to 28 million acres of forest at the time of modern settlement (early to mid-1800's), of which about 70 percent (14 to 19 million acres) may have been old growth (Society of American Foresters Task Force 1983, Spies and Franklin 1988, Morrison 1988, Norse 1988). Historical estimates for northwestern California are not as precise, but suggest there were between 1.3 and 3.2 million acres of old-growth Douglas-fir/mixed conifer and about 2.2 million acres of old-growth coastal redwood (Society of American Foresters Task Force 1983, Laudenslayer 1985, Fox 1988, California Department of Forestry and Fire Protection 1988, Morrison 1988).

An estimated 70 to 80 percent reduction in old-growth forests has occurred since the time of modern settlement in Oregon and Washington (USDI 1989). Old-growth forests in the Douglas-fir/mixed conifer region of northwestern California may have undergone a similar reduction of about 45 to 80 percent since the mid-1800's (Laudenslayer 1985; Green 1985; Fox 1988; California Department of Forestry and Fire Protection 1988). Some recent estimates (Spies and Franklin 1988, Morrison 1988, Norse 1988) suggest that this reported decline in historical habitat, in fact, may have been as high as 83 to 88 percent. Habitat reduction has not been uniform throughout the range of the spotted owl, but has been concentrated at lower elevations and the Coast Ranges. Reduction of old growth is largely attributable to timber harvesting and land conversion practices, although natural perturbations, such as forest fires, have caused losses as well.

Current surveys and inventories have shown that while northern spotted owls are not found in all old-growth forests, nor exclusively in old-growth forests, they are overwhelmingly associated with forests of this age and structure (USDI 1989). Therefore, trends in amount and distribution of old-growth forests may be used as a reasonable indicator of trends in the abundance and distribution of spotted owl populations and habitat over time.

By examining the trends in old-growth forest reduction from the mid-1800's to the present, the Service has extrapolated the loss of old-growth and mature habitat to the middle of the next century (USDI 1989). Based on the assumption that current timber harvest management practices and rates will continue, most commercial old-growth and mature forests (those available for commercial logging) will have been logged and converted to younger stands by the year 2050. Since over 90 percent of presently known spotted owl occurrences and habitat are found on federally managed lands (Forsman *et al.* 1987), future estimates are based upon average annual logging rates and published trend estimates for federal lands only. Relatively speaking, little old growth presently exists on private, State, or tribal lands (Society of American Foresters Task Force 1983; Old-Growth Definition Task Group 1986; Morrison 1988; Spies and Franklin 1988; California Department of Forestry and Fire Protection 1988; Thomas *et al.* 1988; Greene 1988). In addition, current logging practices, such as clearcutting, even-aged management, and short logging rotations, preclude development of future old-growth conditions from existing young forest stands. These non-federal lands historically might have contained a significant amount of owl habitat and may still offer the opportunity to provide vital linkages between islands of federally managed habitat in many areas.

At the current rate of timber harvest, the existing old-growth and mature habitat of the northern spotted owl throughout its range is expected to decline by an additional 50 to 60 percent between 1989 and 2050, from an estimated 7 million acres currently to about 2.7 million acres (USDI 1989). This would represent a total decline of at least 80 to 85 percent from the amount of spotted owl habitat originally estimated for the western part of the Pacific Northwest, including northern California. The figures used to derive this estimate do not include any young-growth forest acreages that might develop old-growth characteristics or conditions during the next 60 years (USDI 1989); as noted earlier, however, conversion of younger habitat to old-growth condition is not expected to be significant unless current logging practices change (Beuter *et al.* 1976; Heinrichs 1983; Society of American Foresters Task Force 1983; Harris 1984; Spies and Franklin 1988). As a result of habitat fragmentation, reduction in individual stand size, and edge effects, it has been speculated that the amount of

biologically effective habitat presently available for the spotted owl (i.e., habitat patches of sufficient size to support reproductively successful owls) may actually be less than 50 percent of the total preferred habitat remaining today. This reduction in the quality of remaining forest habitat under present logging patterns will continue to the point where less than 10 percent of historical levels remains (Harris 1984; Harris *et al.* 1982; Morrison 1988, 1989; Norse 1988).

Under current management plans, the distribution of spotted owl habitat remaining by the year 2050 will closely coincide with National Parks, reserved areas on federally managed forests, or other lands that are not considered suitable or available for timber harvest for other reasons (e.g., lands too steep or rocky for timber production, lands needed for hydrologic protection, scenic areas, etc.). These areas will contribute to maintaining spotted owl populations only to the extent that they contain suitable habitat of adequate size and quality for the birds (USDI 1989). By then, most remaining preferred habitat will not longer be continuous, but will exist as islands of varying size, spacing, and suitability spread over the range of the subspecies. Many of the current wilderness areas and parks are largely high-elevation lands above timberline. Lands unsuited for timber production may have poor soil conditions or be too steep or rocky; such areas generally are not suitable habitat for spotted owls nor are they likely to effectively support successfully reproducing pairs of owls (Meslow, pers. comm.)

To achieve the primary objective of timber management in Oregon, Washington, and northern California of producing wood at a non-declining rate, forests must be intensively managed with average cutting rotations of 70 to 120 years (USDI 1984, USDA 1988). Current preferred timber harvest systems emphasize dispersed clearcut patches for even-age management as the pattern of harvest. Thus, public forest lands that are intensively managed for timber production are, in general, not allowed to develop "old-growth characteristics," which require about 200 years to develop. As a result, loss and fragmentation of remaining forests and old-growth stands suitable for spotted owls will continue if current management practices are unchanged.

Annual cutting rates of old-growth and old-growth/mature age classes of trees have been established by the Forest Service and the Bureau of Land Management (Bureau) (USDI 1989). During the 1980's, the Bureau has been harvesting old-growth and old-growth/mature trees at the rate of about 22,000 acres per year in Oregon. The Forest Service estimates its harvesting of spotted owl habitat (mature and old-growth classes) at the rate of about 36,000 to 40,000 acres per year in Oregon and Washington combined, and 12,000 acres annually in California. Several legal actions against the Forest Service and the Bureau delayed harvest in 1988 and 1989. Unless these cutting rates or patterns of cutting are altered, that portion of existing spotted owl habitat remaining that is available for timber harvest will be gone within about 60 years (USDI 1989).

As a result of past and present harvest patterns, potential isolation of several subpopulations of northern spotted owls is also of considerable concern (e.g., the Olympic Peninsula, the Coast Ranges in southwestern Washington and northwestern Oregon, and the Marin County area in California) (USDA 1988, USDI 1989). The central problem of subpopulation isolation is one of maintaining a critical population size level in the absence of genetic or demographic contributions from other subpopulations. The smaller a population of subpopulation and the greater its isolation from other populations, the greater the risk of its elimination as a result of chance demographic and environmental events or genetic effects (Shaffer 1987b).

The population of spotted owls on the Olympic Peninsula may be isolated demographically, and perhaps even genetically, from other owl populations, since there does not appear to be an effective, self-sustaining population in either southwestern Washington adjacent to the Olympic Peninsula or the northwestern Oregon Coast Ranges (Irwin *et al.* 1988, 1989a; A. Potter, Wash. Dept. of Wildlife, Olympia, WA, pers. comm.; Forsman *et al.* 1977; Forsman 1986; W. Logan, Bureau of Land Management, Salem, OR, pers. comm.). While the population in the Oregon Coast Ranges may not be currently isolated due to a tenuous connection to the Cascade populations at the southern part of the range provided by lands managed by the Bureau, the scale of habitat fragmentation throughout the range is of considerable concern USDI 1989). As one moves north along the Oregon Coast Ranges, habitat ownership becomes fragmented because of checkerboarding of Bureau and private lands and remaining old growth and mature forests become more fragmented as well. During the next 10 to 15 years, given the existing direction of land management, the current degree of isolation on the Olympic Peninsula and the potential for isolation of portions of the Oregon Coast Ranges province are likely to become exacerbated, as most intervening habitat is privately owned.

The Washington and Oregon Cascade populations of owls are at risk of becoming demographically isolated from one another by loss of habitat along the Columbia River corridor. The impounded section of the Columbia River upstream of Bonneville Dam and the associated transportation and urban/agricultural corridor downstream from Bonneville Dam may serve as a significant dispersal barrier to the north-south movement of owls. In addition, the Columbia River downstream from Portland is very wide with little or no old-growth and mature habitat adjacent to the river, nor is there a viable owl population in this area (Logan, pers. comm.; Forsman *et al.* 1977; Forsman 1986; Potter, pers. comm.). In California, isolation of spotted owls may be as great in the tri-county area of Marin, Sonoma, and Napa Counties as it is on the Olympic Peninsula or in the Oregon Coast Ranges (Bontadelli 1989, Gould, pers. comm.).

Most remaining private forest lands as well as much of the publicly owned lands in the range of the northern spotted owl no longer provide continuous parcels of preferred habitat, primarily due to logging practices resulting in fragmentation of the owl's forest habitat. Habitat fragmentation may be defined as the breakup of contiguous tracts of forest habitat into smaller, more isolated parcels (USDI 1989). Timber harvest, employing a pattern of small, dispersed clearcuts, eventually leads to a situation where parcel sizes are so small as to be influenced by edge effects (windthrow, invasion by alien species, microclimatic changes, etc.). As a result, the original parcels may no longer be able to sustain the species or the community originally found in the larger and contiguous tracts of habitat and the quality (i.e., biological effectiveness of the habitat to support successful reproduction) of remaining preferred forest stands may be lessened considerably when the effects of adjacent roads and clearcuts are considered. Impacts from edge effects and environmental disturbances may be most noticeable in areas where little old growth currently remains, for example, in the Oregon Coast Ranges. Fragmentation of habitat can also adversely affect spotted owls by: (1) Directly eliminating key roosting, nesting, or foraging stands; (2) indirectly reducing the survival of dispersing

juvenile owls; (3) perhaps increasing competition or predation, and (4) reducing population densities and interaction between individuals. These factors all interact to decrease habitat quality, suitability, or effectiveness for supporting a well-distributed population of spotted owls over time (Greene 1988, Harris 1984, Meslow *et al.* 1981, Spies and Franklin 1988, Thomas *et al.* 1988).

The patchwork pattern of even-age, dispersed, clearcut timber harvest systems has imposed a checkerboard pattern on present old-growth and mature forests, fragmenting remaining habitat throughout the owl's range and reducing the total amount of suitable spotted owl habitat. This fragmentation of spotted owl habitat may be especially noticeable on Bureau lands which are additionally checkerboarded because of land ownership patterns. Forest Service modeling (USDA 1986) predicts that the mortality of dispersing juvenile owls will increase whenever the amount of suitable habitat areas decreases. As spotted owl habitat continues to be reduced further by timber harvest, the current spotted owl population is expected to decline correspondingly, and perhaps more precipitously. It is unknown whether the amount and distribution of spotted owl habitat remaining at the end of commercial harvest of old-growth forests on public lands (USDI 1989) will be adequate to support a viable population of the northern spotted owl. Attempts to answer this question by using the concepts and tools of population viability assessments have been undertaken by the Forest Service (USDA 1986, 1988) and Lande (1987a, 1987b, 1988). Although subject to criticism on a number of grounds, these assessments indicate that implementation of the Forest Service's preferred alternative for managing the spotted owl in Oregon and Washington (Alternative F, USDA 1988) will not provide a high probability of persistence for the spotted owl over the next 50 to 100 years, at least not in significant portions of its range. Litigation has been initiated regarding the Forest Service's preferred alternative. At this time it is not known whether this alternative will be implemented. Moreover, at this writing, individual forest plans pertaining to spotted owl management based on the regional guidelines have not been finalized.

Although the actual numbers of owl sites and pairs on all lands is not precisely known, recent surveys indicate that there are about 1,500 pairs of northern spotted owls within the present range of the subspecies, of which over 90 percent are found on federally managed lands (USDI 1989). The present population is predicted to decline by about 50 percent (on Forest Service lands) to 75 percent (BLM lands) from present levels over the next 50 to 60 years under current management plans (USDA 1988).

Data contributing to estimates of present population size have been collected for about 20 years, with counts of owls increasing over that period as greater areas of habitat were surveyed (Gould 1985; Gould, pers. comm.; Forsman *et al.* 1987; USDA 1988; Robertson 1989; Vetterick 1989). However, the increase in numbers of spotted owls counted in these surveys reflects an increase in inventory effort and improvements in inventory methods rather than an indication of any upward population trend. Not all forest habitat has been fully surveyed, as some areas, particularly wilderness areas, are difficult to inventory. However, Forest Service and Bureau biologists believe that about 70 to 80 percent of the northern spotted owl population has been inventoried in most cases (Potter, pers. comm.; Logan, pers. comm.; D. Smithey, Bureau of Land Management, Coos Bay, OR, pers. comm.; D. Bonn, Bureau of Land Management, Medford, OR, pers. comm.; J. Lint, Bureau of Land Management, Roseburg, OR, pers. comm.; Gould, pers. comm.; T. Simon-Jackson, USDA Forest Service, San Francisco, CA, pers. comm.; Forsman, pers. comm.). An estimate of population trends in relation to habitat over time is likely to provide a better understanding of this or any habitat specific species than just total numbers of individuals and pairs.

Information about population trends for spotted owls is provided by three different kinds of data: (1) Changes in spotted owl habitat; (2) changes in spotted owl population size; and (3) survival and reproductive rates. Both the close association between the spotted owl and old-growth forests and the dramatic reductions in old growth that have occurred have been thoroughly discussed earlier. This loss of old-growth and mature habitat continues, with projected losses on Federal lands of about 1.5 percent per year (USDA 1988) or greater (Morrison 1988). A number of biologists knowledgeable about spotted owls have reported declines in owl populations in many areas over the species' range in recent years, commensurate with declines in habitat (A. Franklin, Humboldt State Univ. Arcata, CA, pers. comm.; Meslow pers. comm.). Finally, when the best available estimates of spotted owl survival and reproductive rates are combined and analyzed, resulting values point to a declining population (USDI 1989).

Based on ecological theory, several predictions about the effects of continued harvesting of preferred habitats on the future demographic performance of spotted owls can be made. Given the data, it is likely that continued harvest of preferred habitat will adversely affect spotted owl populations. As more of this habitat is removed and fragmented, the following is expected to occur: (1) Individual owls will have to use habitats comprised of a higher proportion of young forests, necessitating an increase in their home range size to meet their energetic and nutritional requirements and resulting in an overall decrease in density of spotted owls; and (2) as more owls use less suitable habitats, there will likely be a decrease in the average reproductive success of the population as a whole. Analysis of available information for spotted owls seems to support these theoretical predictions (USDI 1989).

The reported variation in per capita reproductive rates between habitats of different suitability implies that owls using young-growth forests may actually contribute proportionately less to population recruitment than their numbers would suggest. Because of apparent differences in reproductive rates, it would be incorrect to assume that a given owl population, normally concentrated in old-growth forests, could be maintained for any length of time on a relatively larger area of less suitable, young forests. The data on spotted owls suggest that use of young forests by owls is dependent on the presence of old-growth stands within the home range.

Fragmentation can also have harmful genetic consequences through its effect on the effective population size. Each subpopulation occupying a discrete habitat patch, such as those that result from habitat fragmentation, comprises a component of the overall population, referred to as a "metapopulation." The processes of extinction and colonization within individual patches can have deleterious genetic effects that might not be predicted by models that do not consider metapopulation structure (USDI 1989).

Although natural habitat is never constant, the original old-growth forest habitat probably was fairly stable and continuous over much of the owl's historical range. Natural perturbations would generally tend to be small and localized, creating occasional openings in an otherwise fairly continuous and

closed-canopy forest environment. The current habitat situation for spotted owls continues to change from the original condition where unsuitable habitat patches were small and isolated, to the reverse where suitable habitat now occurs in small and isolated patches. These factors all interact to decrease habitat suitability or effectiveness for supporting a well-distributed population of spotted owls over time (Greene 1988; Harris 1984; Meslow *et al.* 1981; Spies and Franklin 1988; Thomas *et al.* 1988).

Spotted owl population viability assessments performed to date (USDA 1986, 1988; Lande 1987a, 1987b, 1988) have not explicitly considered habitat differences in reproductive rates and how different fitnesses of owls in different habitats would affect population dynamics. In particular, the life table and population viability analyses that have been performed to date may present an optimistic view of the future status of spotted owl populations for two reasons (USDI 1989). First, the population viability analyses conducted by the Forest Service were based on a single frequency distribution of reproduction rates, with a mean value from owl pairs in the most preferred habitats. However, as discussed previously, theory and empirical data suggest that owl pairs in less suitable, younger habitats may have significantly lower per capita reproductive rates. Therefore, as more preferred habitat is cleared, population growth rates may be reduced to values lower than were used in existing models. Second, the Forest Service's population viability analyses assume that a given Spotted Owl Habitat Area (SOHA) will be occupied with a probability proportional to the amount of old-growth forest within the SOHA. However, the assumed relationship is based on the present landscape configuration, the existing amounts of old growth, and the current spatial relationships between old growth and young growth forests. The assumed SOHA occupancy probabilities are likely to decline as surrounding old growth is cleared and SOHAs become more isolated from other large patches of preferred habitat. These points are intended to emphasize the fact that the models should be interpreted cautiously, and that planning for the owl should include built-in safety factors to insure that future habitat requirements for a viable population are not underestimated.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Considerable research by Federal, State, and private groups is being conducted on this subspecies. This work is providing valuable information and is not having a negative impact on the subspecies. The spotted owl is not a game bird, nor is there any known commercial or sporting use.

C. Disease or Predation

Predation by great horned owls (*Bubo virginianus*) has been identified as a major source of juvenile mortality in spotted owls (USDI 1987; Dawson *et al.* 1986; USDA 1986; Simberloff 1987; and USDA 1988). Concern has been expressed that increasing habitat fragmentation may be subjecting spotted owls to greater risks of predation as they move into or across more open terrain, or come into more frequent contact with forest edges where horned owls may be more numerous. Hamer (1989) has been studying spotted owl and great horned owl interactions in the north Cascades of Washington. His survey of the 145-square-mile Mt. Baker study area showed that great horned owls were more common than spotted owls in this mostly fragmented and young-growth dominated habitat. He found, with a limited sample size, that spotted owls avoided areas intensively used by pairs of great horned owls. In young-growth forests in southwestern Washington, Irvin *et al.* (1989a) reported that great horned owls, along with the western screech owl (*Otus asio*), were the most commonly found owls, and that spotted owls were infrequently found. Specific impacts of great horned owl predation on the overall spotted owl population are unknown, but this remains an issue of concern. Parasites have been found in blood samples of the northern spotted owl, although their significance and potential impact on the subspecies are unknown at the present time (Gould, pers. comm.).

D. The Inadequacy of Existing Regulatory Mechanisms

There are numerous State and federal laws and regulations that, if enforced, may protect spotted owls and, to a lesser extent, spotted owl habitat. Implementation and effectiveness of these laws to date, however, has been variable.

Each of the three States in which the subspecies occurs has recognized the precarious status of the owl. It is listed as endangered by the State of Washington, threatened by the State of Oregon, and as a sensitive species by the State of California. State laws in Washington and Oregon offer little regulatory protection to the spotted owls other than a prohibition against taking. In California, timber management plans require the approval of the Department of Fish and Game.

The Federal Migratory Bird Treaty Act (16 U.S.C. 703 *et seq.*) prohibits taking of spotted owls or their eggs or nests unless and except as permitted by regulation. The Act imposes criminal penalties for unlawful taking.

The National Park Service is required by statute to manage National parks to conserve their wildlife (16 U.S.C. 1). Approximately 8 to 10 percent of spotted owl habitat is located within National parks.

The National Forest Management Act of 1976 and its implementing regulations require the Forest Service to manage National Forests to provide enough habitat to maintain viable populations of native vertebrate species, such as the spotted owl. These regulations define a viable population as one which "has the estimated numbers and distribution of reproductive individuals to ensure its continued existence is well-distributed" (36 CFR 219.19).

The Forest Service manages about two-thirds of the current northern spotted owl habitat. Spotted owl management on National Forest lands in California, Oregon, and Washington is based on regional guidelines adopted by the Pacific Southwest Region (Region 5) for California and by the Pacific Northwest Region (Region 6) for Oregon and Washington. These guidelines provide for a network of forest-wide owl sites (Spotted Owl Habitat Areas or SOHAs) containing 1,000 acres in California and from 1,000 to 3,000 acres in Washington and Oregon. Some of these sites will be located in areas not available for timer harvest (e.g., natural areas, research areas, wilderness), but the majority of the sites (60 to 70 percent) would be surrounded by commercial timber land available for logging.

The Forest Service has prepared a Final Supplement Environmental Impact Statement (USDA 1988) with a preferred alternative to implement forest plans to manage about 300 spotted owl habitat areas within its lands in Oregon and Washington. In California, the Forest Service is implementing a similar network system to manage about 250 owl habitat areas within its lands. The intent of this system in both Forest Service Regions is to maintain the viability of the subspecies through a network system that is evenly distributed over the range of the owl.

Sites were to be selected based upon known owl presence, although some sites were actually selected on their potential to contain owls rather than current occupancy. The potential success of this effort cannot be determined yet, since there have been insufficient time and data to determine trends.

In late 1988, the Forest Service made its final Record of Decision on spotted owl management guidelines for National Forests in Washington and Oregon. The decision provides guidance (habitat amount, location, juxtaposition) to set aside a network of selected SOHAs, totaling approximately 374,000 to 477,000 acres in Washington and Oregon forests. The Forest Service in California is preparing to finalize Forest plans implementing a similar habitat management plan on the four National Forests in the northern spotted owl's range.

The Forest Service's Record of Decision for Oregon and Washington set a timetable of 5 years for a full review of the Forest Service's owl management program, continued implementation of a $5 million annual Research, Development, and Application Program, and reaffirmed the Forest Service's commitment to coordinate and cooperate with other agencies. The Forest Service's spotted owl habitat guidelines are the subject of several current lawsuits. Whether or not the current habitat guidance will stand is unknown. In addition, the final Forest Service spotted owl decision only addresses regional standards and guidelines for spotted owl management. The actual implementation of owl management will be based on individual forest plans once they are finalized. A thorough assessment of the impacts of the Forest Service's preferred alternative for each forest is not possible at this time since the actual arrangements (location and juxtaposition) of occupied management areas (SOHAs) have not been tested or available for interagency or public review.

The Bureau of Land Management administers approximately 11 percent of spotted owl habitat, mostly in Oregon. Most Bureau forest lands in Oregon are administered under the provision of the Oregon and California Act, which mandates management of these lands for permanent forest production. These lands cannot be withdrawn or set aside for other long-term management objectives unless other applicable statutes permit. However, short-term (10-year) restrictions can be placed on certain tracts during a 10-year planning period (W. Nietro, Bureau of Land Management, Portland, OR, pers. comm. 1989). Currently, there are timber harvesting restrictions on 110 Spotted Owl Management Areas (SOMAs) that are managed by the Bureau under a cooperative agreement with the Oregon Department of Fish and Wildlife through 1990. The intent is to provide linkages and habitat for 90 pairs of owls between Forest Service lands in the Oregon Cascades and Coast Ranges and to preserve the integrity of these sites into the next planning period. These pairs constitute approximately one-third of the known spotted owl pairs on Bureau lands in Oregon. The Bureau only manages small parcels of owl habitat in California and none in Washington.

The success (viability) of spotted owl pairs, in terms of survival and reproductive output, is predicted largely on the sufficiency of their habitat to support the full range of physical, behavioral, and nutritional needs of the subspecies as expressed by measurement of owl use. Selected SOHA or SOMA size in the Forest Service's FSEIS and the Bureau of Land Management/Oregon Department of Fish and Wildlife agreement is generally less than the mean amount of preferred habitat documented within the home ranges of paired owls studied in all physiographic provinces (USDI 1989). As a consequence, some pairs may not persist in less than optimally sized habitats (Ruggiero *et al.* 1988).

According to the final regional guidance, and the Record of Decision (for Oregon and Washington), the Forest Service does not quantitatively provide for long-term contingencies in the case of catastrophic environmental events. Similarly, current spotted owl habitat management by the Bureau does not take into consideration or provide for such events.

In August 1988, an Interagency Agreement established in 1987 between the Fish and Wildlife Service and the Forest Service was expanded to include the Bureau of Land Management and the National Park Service. This agreement requires the four agencies to cooperate, coordinate, exchange data, and review proposals designed to manage and protect owl habitat; it also commits them to manage land to maintain viable, well-distribute spotted owl populations. However, at this time, there are no coordinated management schemes in place among the agencies; the Forest Service and Bureau have developed timber harvest proposals and spotted owl protection strategies independently of each other.

The cumulative impact of timber-cutting practices by land managing agencies increases and exacerbates the fragmentation of existing owl habitat. The proposed spotted owl management plans of the Forest Service and Bureau of Land Management are untested. Recent legal actions aside, there is no indication from the land management agencies that the current rate of change from old growth to young, even-aged forest management will diminish. Further, as agencies concentrate their clearcutting activities outside of designated spotted owl habitat management areas, future habitat management options will be lost if currently planned habitat networks prove later to be deficient.

E. Other Natural or Man-Made Factors Affecting Its Continued Existence

The barred owl (*Strix varia*), has undergone rapid range expansion over the past 20 years into the range of the spotted owl in the northwestern United States (Hamer 1988; USDI 1989). Gould (pers. comm.) indicates that the barred owl now occurs as far south as Mendocino County, California. Furthermore, it has at least replaced, and possibly displaced, the northern spotted owl in some areas (Forsman and Meslow 1986; Allen *et al.* 1985; Hamer and Samson 1987). Hamer (1988, 1989) noted that the barred owl seems to be more prevalent in cut-over areas than spotted owls. On his study area in the northern Cascade Mountains of Washington, the barred owl is now 2.1 times more numerous than the spotted owl.

The barred owl's adaptability and aggressive nature appear to allow it to take advantage of habitat perturbations, such as those that result from habitat fragmentation, and to expand its range where it may compete with the spotted owl for available resources. The long-term impact to the spotted owl is unknown, but of considerable concern. Continued examination is warranted of the role and impact of the barred owl as a congeneric intruder in historical spotted owl range and its relationship to habitat fragmentation. The potential for interbreeding of the two species also merits concern and monitoring.

There are numerous examples of extrinsic factors such as fires, wind damage, and volcanic action affecting forest habitat, including known spotted owl habitat. These natural occurrences have not been factored into any future projections of population persistence of the spotted owl, and their impact is unknown. Genetic problems (such as

inbreeding) have not yet been considered a problem with spotted owls.

In its Status Review and Supplement (USDI 1987, 1989), the Service has compiled and carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to propose this rule. Based on this evaluation, the Service has found that listing the northern spotted owl as a threatened species throughout its range is warranted. The Endangered Species Act of 1973 (Act), as amended, states that the term "endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range. The term "threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Given the loss of a substantial amount (70 to 80 percent) of historical habitat from timber harvesting, and continuing and planned reduction and fragmentation of a large portion of the remaining old-growth and mature habitat, the northern spotted owl population will continue to decline unless steps are taken to offset these losses.

The northern spotted owl shows a clear preference throughout its range for old-growth forests and forests with old-growth characteristics for nesting, foraging, and roosting. Forests are considered "old growth" when about 200 or more years of age, although some old-growth characteristics preferred by spotted owls may appear prior to that age in mature timber (from about 100 to 200 years of age). As a result of historical and ongoing timber harvest, the once extensive and continuous old-growth forests are being converted to a patchwork landscape dominated by young, even-aged stands. Existing timber management planning and policies do not provide for old growth replacement because of rotation periods ranging from about 70 to 120 years on federal lands to as little as 40 years on private lands.

If current management practices continue, by the year 2050, most commercial old-growth forests will have been logged and converted to younger, even-aged managed forests. This would represent a total decline of at least 80 to 85 percent from the amount of preferred habitat originally estimated for the western part of the Pacific Northwest, including northern California. Impacts from timber harvesting are rangewide and, in addition to causing the direct loss of preferred habitat, appear to be affecting the quality of the remaining forest habitat throughout much of the species' range. Moreover, the total population of spotted owls is relatively low (recent surveys report about 1,500 pairs) and pairs are relatively widely spaced. This subspecies has very specific and narrow habitat requirements. With a low, variable reproductive rate and a low population density, a consequence partly of its large home range requirements, the spotted owl would be especially vulnerable to localized catastrophic events. Lastly, current and proposed management practices may not be designed for nor be sufficient to ensure long-term population viability of the spotted owl. On the basis of the best scientific and commercial data available, the Service believes that threatened status is warranted rangewide for the entire population of the northern spotted owl.

Under the Act's definition, to be considered for endangered classification, the spotted owl would have to be in danger of extinction throughout all or a significant portion of its range. While the available data indicate a gradual, rangewide decline in the species commensurate with habitat loss, they do not suggest that extinction is an imminent possibility. The Service recognizes that the situation is most serious in the California Coast Range (especially Marin and Sonoma Counties), the Oregon Coast Ranges (beginning with Coos Bay Bureau of Land Management lands north to the Columbia River), and from the Olympic Peninsula south to the Columbia River. However, when the status of the entire subspecies is analyzed rangewide, it is the Service's conclusion that the likelihood of extinction of the subpopulations of the owls in these areas is not so immediate as to justify a rangewide endangered classification at this time. The Olympic Peninsula population of the northern subspecies may be the only unit that could qualify as a distinct population under the Act. However, it was not clear that identifying this as a separate population was fully justified by the data or that the immediacy of threat in relationship to other areas was sufficient to warrant a separate designation as endangered at this time.

Critical Habitat

Section 4(a)(3) of the Endangered Species Act (Act), as amended, requires that, to the maximum extent prudent and determinable, the Secretary propose critical habitat at the time the species is proposed to be listed as endangered or threatened.

The Service finds that critical habitat for the northern spotted owl is not presently determinable. The Service's regulations (50 CFR 424.12(a)(2)) state that critical habitat is not determinable if information sufficient to perform required analyses of the impacts of the designation is lacking or if the biological needs of the species are not sufficiently well known to permit identification of an area of critical habitat. By critical habitat is meant "specific areas within the geographical area currently occupied by a species on which are found the physical or biological features essential to the conservation of the species and that may require special management considerations or protection" (50 CFR 424.02(d)).

The extensive range of the northern spotted owl, from British Columbia to San Francisco Bay, involves over 7 million acres of its preferred old-growth and mature forest habitat and an undetermined amount of other forest types that may also be of significance to the survival and recovery of the subspecies. Much of this habitat has been fragmented by logging, and many stands are isolated from each other or of such small size as not to support viable populations of spotted owls. The specific size, spatial configuration and juxtaposition of these essential habitats as well as vital connecting linkages between areas necessary for ensuring the conservation of the subspecies throughout its range have not been determined at this time, nor have analyses been conducted on the impacts of a designation.

During the proposed comment period, the Service will seek additional agency and public input on critical habitat, along with information on the biological status of and threats to the spotted owl. The Service intends to use this and other information in formulating a decision on critical habitat designation for the spotted owl.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of

Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR Part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. Regulations governing these conferences are found at 50 CFR 402.10. If a species is listed subsequently, Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

The U.S. Forest Service and Bureau of Land Management have active timber sale programs in the Pacific Northwest, including northern California, whereby private timber companies bid for the right to log Federal land. In Fiscal Year 1989, the Forest Service had 425 timber sales containing about 48,000 acres that included at least some northern spotted owl habitat. To date, the Forest Service has been enjoined through court action from completing 165 timber sales, totalling approximately 22,500 acres, largely because of spotted owls and old growth issues. About 52 timber sales, representing roughly 2,600 acres, have been released by the Court and subsequently offered for sale (G. Gunderson, USDA Forest Service, Portland, OR, pers. comm.). It is anticipated that future proposed sale activity will be similar, but will depend in part, upon the outcome of a number of unresolved court challenges.

In 1988, the Bureau of Land Management advertised 229 timber sales for a total of 29,798 acres. Of these planned sales, 41 (5,330 acres) are involved in an existing lawsuit. During 1989, the Bureau plans to advertise 190 timber sales to harvest 24,655 acres; there is also an existing lawsuit involving 75 of these sales, covering 9,750 acres, (Nietro, pers. comm.). On an annual basis, the Bureau awards contracts to harvest 32,940 acres, of which 22,800 acres are clearcut and 10,140 acres are partially cut. Of the acreage cut, approximately 66 percent of the harvest is in forests over 200 years old (Nietro, pers. comm.).

Because habitat loss and modification resulting from timber harvesting activities represents the primary threat to the northern spotted owl, the Forest Service and Bureau will review and assess the potential impacts of timber sales on this species to ensure compliance with Section 7 of the Act, as described above.

The Act and implementing regulations found at 50 CFR 17.21 and 17.31 set forth a series of general prohibitions and exceptions that generally apply to threatened wildlife. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these), import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving threatened wildlife species under certain circumstances. Regulations governing permits are at 50 CFR 17.22, 17.23, and 17.32. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities. For threatened species, there are also permits for zoological exhibition, educational purposes, or special purposes consistent with the purposes of the Act.

On June 28, 1979, the order Strigiformes, which includes all owls, was included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The effect to this listing is that export permits are generally required before international shipment may occur. Such shipment is strictly regulated by CITES party nations to prevent effects that may be detrimental to the species' survival.

Public Comments Solicited

The Service intends that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule are hereby solicited. Comments particularly are sought concerning:

(1) Biological, commercial trade, or other relevant data concerning any threat (or lack thereof) to this species;

(2) The location of any additional populations of this species and the reasons why any habitat should or should not be determined to be critical habitat as provided by Section 4 of the Act;

(3) Additional information concerning the range, distribution, and population size of this species; and

(4) Current or planned activities in the subject area and their possible impacts on this species.

Final action concerning this proposal will take into consideration the comments and any additional information received by the Service, and such communications may lead to a final regulation that differs from this proposal.

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to Section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of all references cited herein is available upon request from the Regional Director (Attention: Listing Coordinator), U.S. Fish and Wildlife Service, 1002 NE Holladay Street, Portland, Oregon 97232.

Authors

The primary author of this proposed rule is Joseph J. Dowhan, U.S. Fish and Wildlife Service, Pacific Regional Office, 1002 NE. Holladay St., Portland, Oregon 97232–4181 (503/231–6150 or FTS 429–6150), and the Service's Northern Spotted Owl Status Review Team.

List of Subjects in 50 CFR Part 17

Endangered and threatened wildlife, Fish, Marine mammals, Plants (agriculture).

Proposed Regulation Promulgation

PART 17—[AMENDED]

Accordingly, it is hereby proposed to amend Part 17, Subchapter B of Chapter I, Title 50 of the Code of Federal Regulations, as set forth below:

1. The authority citation for Part 17 continues to read as follows:

Authority: Pub. L. 93–205, 87 Stat. 884; Pub. L. 94–359, 90 Stat. 911; Pub. L. 95–632, 92 Stat. 3751; Pub. L. 96–159, 93 Stat. 1225; Pub. L. 97–304, 96 Stat. 1411; Pub. L. 100–478, 102 Stat. 2306; Pub. L. 100–653, 102 Stat. 3825 (16 U.S.C. 1531 *et seq.*); Pub. L. 99–625, 100 Stat. 3500, unless otherwise noted.

2. It is proposed to amend § 17.11(h) by adding the following, in alphabetical order under Birds, to the list of Endangered and Threatened Wildlife:

§ 17.11 Endangered and threatened wildlife

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
Birds							
*	*	*	*	*	*	*	
Owl, northern spotted.	*Strix occidentalis caurina.*	U.S.A. (WA, OR, CA); Canada (British Columbia).	Entire	T		NA	NA
*	*	*	*	*	*	*	

Dated: June 15, 1989.

Susan Recce Lamson,

Acting Assistant Secretary for Fish and Wildlife and Parks.

[FR Doc. 89–14889 Filed 6–22–89; 8:45 am]

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